



A SAND WAVE SIMULATION MODEL

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Sand waves form a prominent regular pattern in the offshore seabeds of sandy shallow seas. A two dimensional vertical (2DV) flow and morphological numerical model describing the behaviour of these sand waves has been developed. The model contains the 2DV shallow water equations, with a free water surface and a general bed load formula. The water movement is coupled to the sediment transport equation with a seabed evolution equation. The domain is non-periodic in both directions. The spatial discretisation is performed by a spectral method based on Chebyshev polynomials. A fully implicit method is chosen for the discretisation in time. Firstly, we validate the model mathematically by reproducing the results obtained using a linear stability analysis for infinitely small sand waves. Hereby, we investigate a steady current situation induced by a wind stress applied at the sea surface. The bed forms we find have wavelengths in the order of hundreds of metres when the resistance at the seabed is relatively large. The results show that it is possible to model the initial evolution of sand waves with a numerical simulation model. Next, we investigate the influence of the chosen turbulent viscosity parameterisation by comparing the constant viscosity model with a depth dependent viscosity. This paper forms a part of a study to investigate the intermediate term behaviour of sand waves.